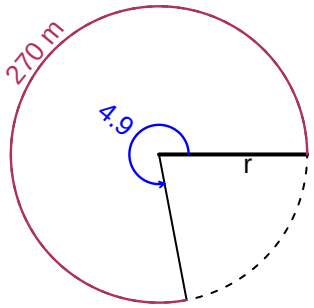
Name: Date:

Trig Final (Solution v7)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 270 meters. The angle measure is 4.9 radians. How long is the radius in meters?

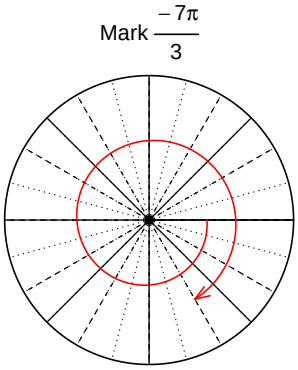


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

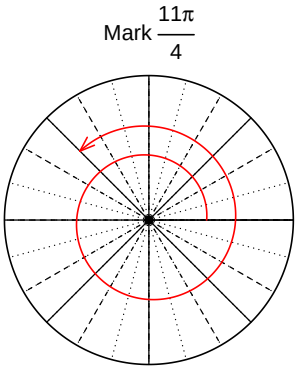
$r = 55.1$ meters.

Question 2

Consider angles $\frac{-7\pi}{3}$ and $\frac{11\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{-7\pi}{3}\right)$ and $\sin\left(\frac{11\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\cos(-7\pi/3)$



Find $\sin(11\pi/4)$

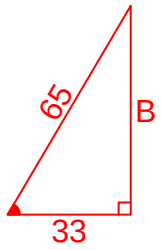
$\cos(-7\pi/3) = \frac{1}{2}$

$\sin(11\pi/4) = \frac{\sqrt{2}}{2}$

Question 3

If $\cos(\theta) = \frac{33}{65}$, and θ is in quadrant IV, determine an exact value for $\sin(\theta)$.

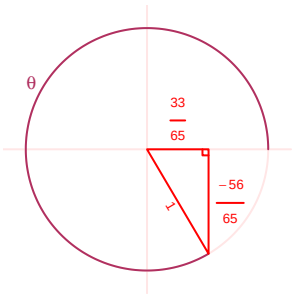
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$33^2 + B^2 = 65^2$$
$$B = \sqrt{65^2 - 33^2}$$
$$B = 56$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\sin(\theta) = \frac{-56}{65}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 8.89 Hz, a midline at $y = -7$ meters, and an amplitude of 3.66 meters. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -3.66\cos(2\pi 8.89t) - 7$$

or

$$y = -3.66\cos(17.78\pi t) - 7$$

or

$$y = -3.66\cos(55.86t) - 7$$